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A Brief History of the New England Offshore Fisheries

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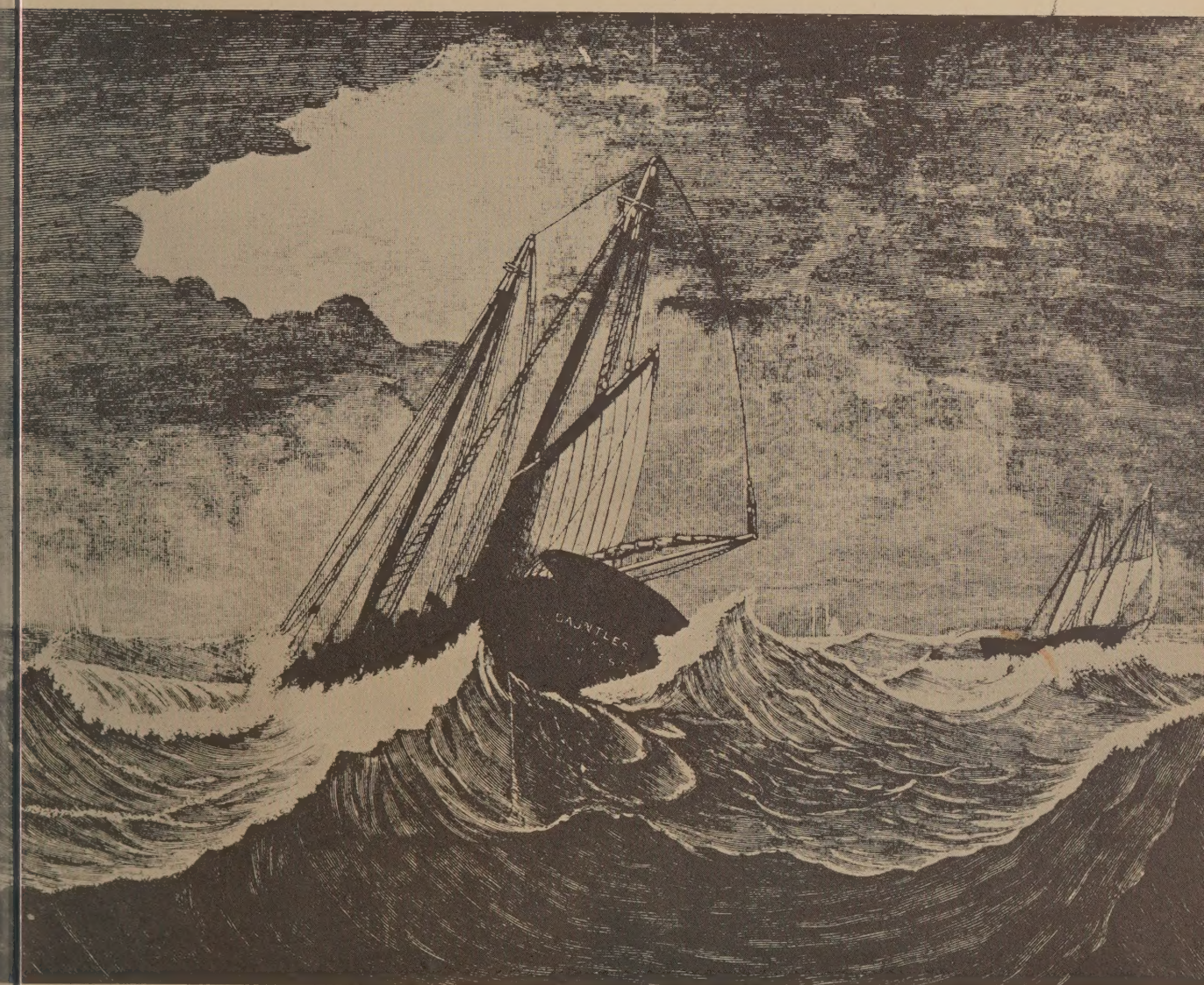
By

Albert C. Jensen



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

Fishery Leaflet 594

UNITED STATES DEPARTMENT OF THE INTERIOR
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ALBERT C. JENSEN

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A Brief History of the New England Offshore Fisheries

By

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ABSTRACT

The leaflet describes the origin and subsequent development of several of the principal offshore fisheries of New England. It traces the industry from the Colonial period when the chief catch was cod to the present day when a variety of species is caught and marketed. The fishing gear is described and illustrated, and technological developments in handling the catch at sea and ashore are briefly explained.

INTRODUCTION

The first settlers of New England arrived there to ". . . serve their God and to fish" (Wheeler, 1955). The success of their fishing efforts was such that the fish supplied the first American articles of export and laid the foundation for worldwide sea navigation and commerce. The earliest fishery was for codfish.[2] It was the only fish sought for food until about 1818, although small mackerel were caught to bait the cod lines. After 1818, other species entered the markets and, by 1830, mackerel, herring, white hake, menhaden, shad, and halibut were taken extensively (Bureau of Fisheries, 1935.) Later, haddock, whiting, flounders, and ocean perch became important in the offshore fisheries and were harvested on a grand scale. This review is concerned first with the New England fishery for cod and a description of the fishing grounds and the gear. The other major fisheries that developed are discussed in chronological order.

THE COD FISHERY

Intensive harvesting of the Northwest Atlantic cod resource began in the 16th Century when French and Portuguese vessels fished the Grand Bank off Newfoundland (Taylor, 1957). By the early 17th Century, the New England colonists were fishing for cod in the local waters. In 1624, "not less than 50 vessels from Gloucester" fished with hand lines in the offing of Maine and Massachusetts (Babson, 1860).

Fishing Areas

The grounds fished in the early days are familiar names today (fig. 1): Jeffreys Ledge, Cashes Ledge, Nantucket Shoals, and the many small ridges, swells, and holes noted on hydrographic charts of the region. The scope of the operations soon began to change, however.

By 1708, New England vessels were fishing the Nova Scotian banks, and in 1748 the first catch of cod from Georges Bank was landed. It was not long before the trips were even longer. In 1757, Gloucester vessels ventured to the Grand Bank off Newfoundland. Presumably cod were more abundant and fishing was more successful there, because by 1788 as many as 60 Gloucester boats were fishing on Grand Bank (Babson, 1860).

Fish Abundance

It seems reasonable to suspect that cod abundance was low in the local New England waters in the late 18th Century. Few fishermen would risk a long trip offshore in small, wooden vessels if cod were abundant nearby.

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[2] Scientific names are listed in the appendix.

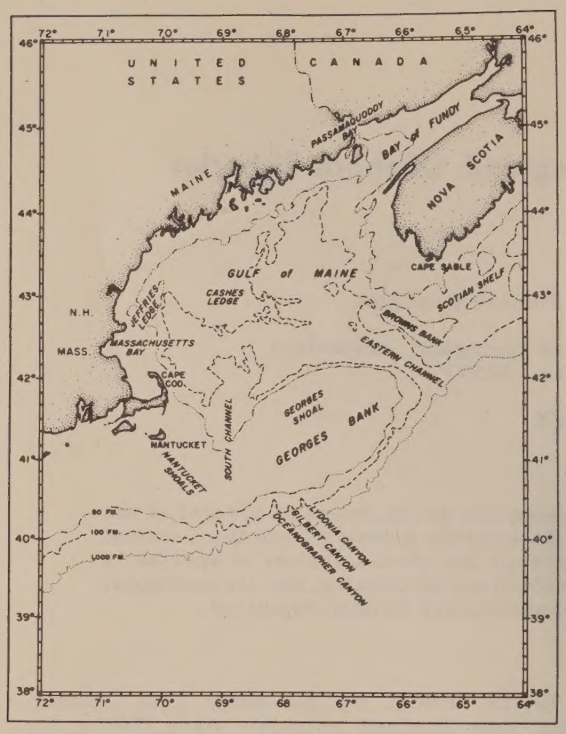


Figure 1.--Some grounds of the New England offshore fisheries. The Grand Bank of Newfoundland and some of the Nova Scotian banks are not shown here.

Dams built to supply textile mills with power were blamed by Baird (1874) for the scarcity of fish. The dams blocked the spawning runs of alewives on which the cod fed, he noted, and when alewife abundance declined, cod abundance also declined. (Biologists know today, of course, that alewives and other fishes form only a small part of the diet of codfish. Cod feed mostly on invertebrates. Thus, the decline in the abundance of cod was probably caused by some other factor, perhaps overfishing.)

The success of the New England cod fisheries varied greatly over the years. Whereas 60 Gloucester vessels fished offshore in 1788, only 8 vessels fished offshore 12 years later. By 1819, the fisheries were in a severe economic depression; to help the fishermen, Congress passed a "bounty act"--a form of subsidy (Earll, 1880). The act evidently served the purpose. Some new vessels were built, and new life was put into the industry.

Many of the fishermen's problems then were much different from those in our modern fleets. Occasionally, only the dregs of the waterfront were available to crew the vessels. These men worked as little as possible and required constant supervision. When poor crewmen were coupled with a scarcity of fish, the problems were such that it was said of one skipper (Sabine, 1853), "...the fear of making a 'broken voyage' kept him awake and at his post full twenty hours every day throughout the time employed in taking fish."

Toward the close of the 19th Century, bank fishing, mostly on Georges and Browns banks, was a flourishing industry with 174 dory schooners taking part. In 1879, the equivalent of 92 million pounds of round fresh cod was landed by the salt-bankers (Earll, 1880). In 1880, a record was set when 294 million pounds of cod were landed (Sette, 1928). Further details of the landings are discussed later.

Fishing Gear

Some of the fluctuations in landings and apparent abundance of fish were caused by changes and improvements in the fishing gear. No doubt the earliest kinds of gear used by the New England colonists included weirs and traps (figs. 2, 3) adapted from the ones used by the local Indians (Brigham, 1962). But the usual kind of gear was the handline fished from small boats in the harbors and bays.

Handlines.--Handlines had been used for about 200 years aboard the European vessels that fished the Grand Bank. At first, the lines were fished from the deck of the

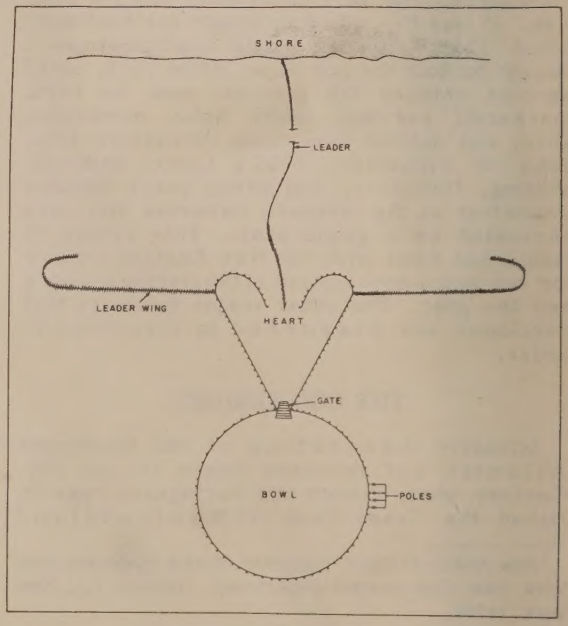


Figure 2.--A fish weir or trap.

vessel (figs. 4, 5) but later, they were fished by one- and two-man crews in dories (fig. 6) carried to the fishing ground by the vessel (Taylor, 1957).

Figure 3.--Seining the catch trapped in the bowl of the weir.

Line trawl.--About 1770, the Dutch developed the line trawl (figs. 7, 8)--a longline with a series of baited hooks attached at intervals (see Jensen and Brigham for present-day usage of the gear). American fishermen were somewhat slow in adopting the longline, in part because of the hue and cry that it was a harmful gear (Perley, 1852). Originally called a "bultow," the line trawl was said to cause a school of cod to desert the grounds because fish that had torn loose from the hooks frightened others. A group of 137 fishermen from Block Island submitted a petition of protest to the U.S. Fish Commission in 1877 (Dodge and others, 1880). The petitioners claimed that, "Suffering from the lacerations of the hook, and fearful of becoming again entrapped, [the cod] communicate their fears to their sympathizing companions."

But, New England fishermen eventually did adopt the line trawl (Alexander, Moore, and Kendall, 1915). The trawls at first were set from the vessel but later, as with the handlines, they were set from dories. The line trawls efficiently caught all species of groundfish except, usually, flounders, ocean perch, small haddock, and small cod (Ackerman, 1941).

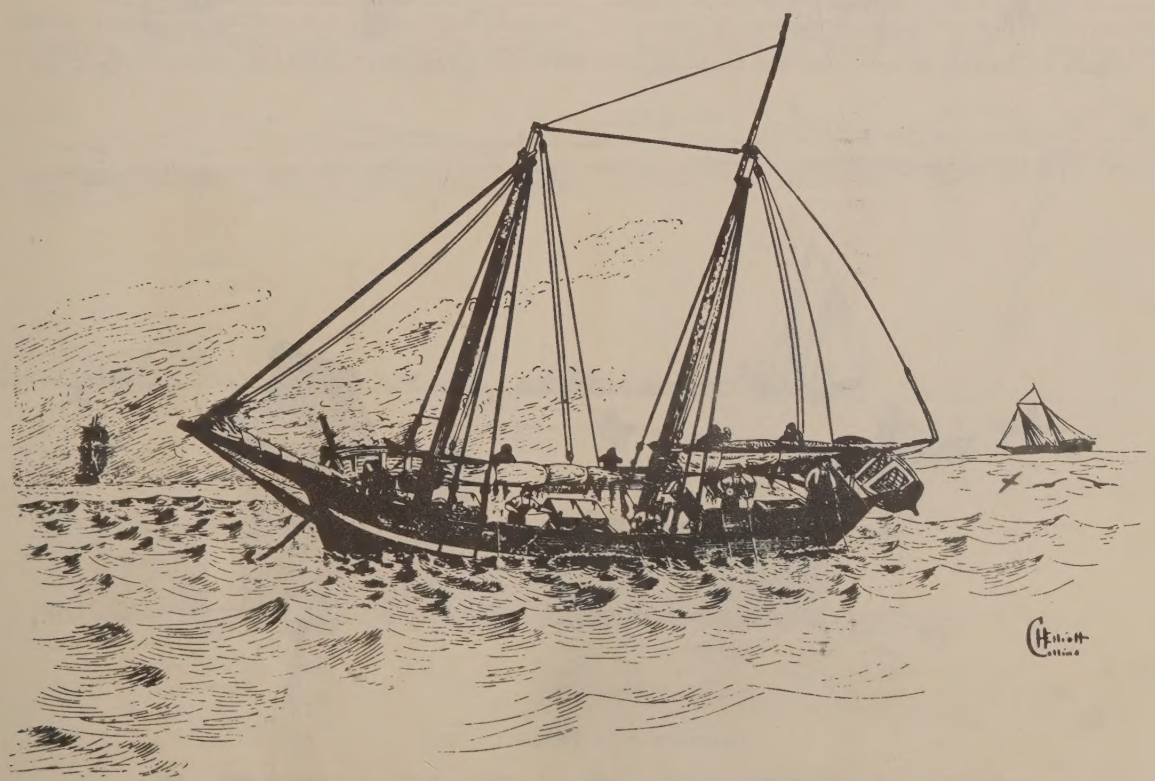


Figure 4.--Handlining for cod from the deck of a vessel anchored on Georges Bank. (From Goode, 1897.)

Figure 5.--Landing the cod caught with handlines. Gaffs were used to haul aboard large fish. (From Goode, 1897.)

Figure 6.--Handlining for cod from a dory. (From Goode, 1897.)

Gill nets.--Line trawls were the principal fishing gear until Spencer F. Baird introduced Norwegian gill nets (fig. 9) to the cod fishery at Cape Ann in 1878 (Collins, 1887). The nets successfully trapped the cod, but the twine was too frail to survive the struggles of the large fish. A second trial with stronger gill nets during the winter of 1880-81 in Ipswich Bay was very successful.

Gill nets, originally set and hauled by hand from a dory, were not as popular as line trawls until about 1908, when five or six small Great Lakes gill netters, fully equipped, arrived in Gloucester from Michigan (Haberland, 1946). They used a mechanical

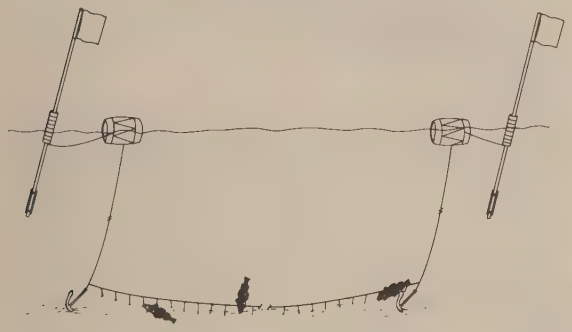
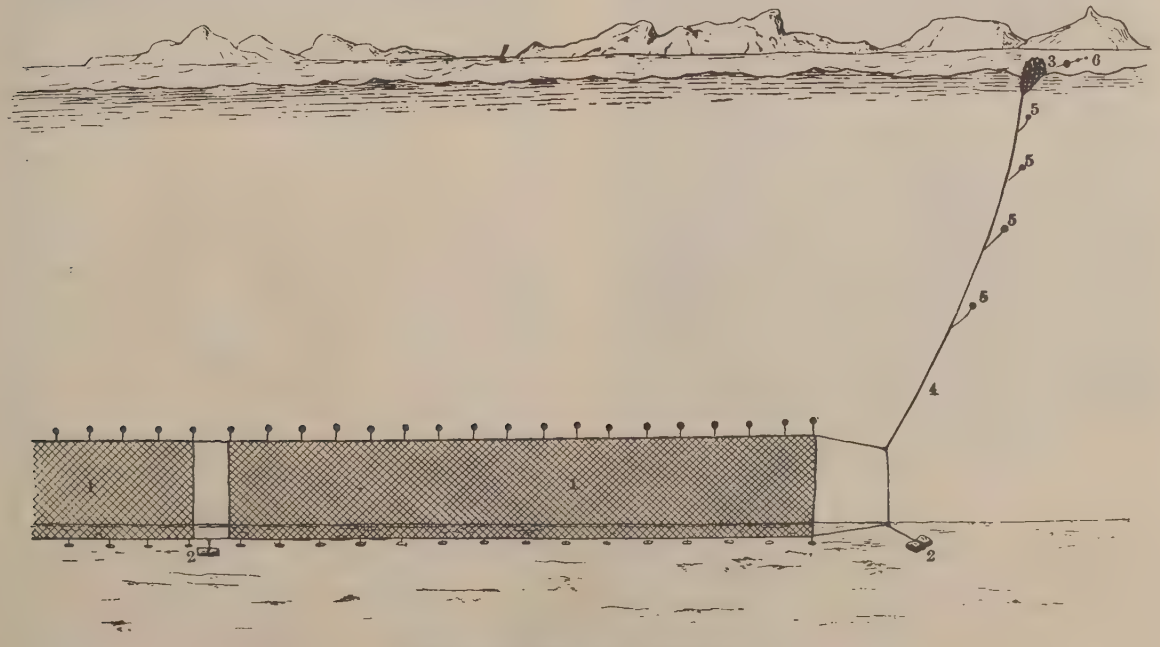


Figure 7.--A diagram of a New England line trawl (or longline) as it is fished today. The gear is basically the same as that used by dorymen 75 years ago.

Figure 8.--Setting out a line trawl from a present-day vessel out of Chatham, Mass. The line and the attached baited hooks are flipped out of the tub with the light stick.



THE GILL-NET COD FISHERY.

1, Nets. 2, Large stones used for moorings. 3, Buoy. 4, Buoy-line. 5, Glass floats attached to buoy-line. 6, Watch-floats.

Figure 9.--The Norwegian gill net as introduced into New England by Spencer F. Baird in 1878. (From Goode, 1897.)

lifter which allowed them to set and haul the nets directly from the vessel.

Gill nets gradually came into wider use in New England because they were adaptable to small boats, did not require large crews, did not need powerful engines in the vessel (as do otter trawls), and were more efficient than the handlines or line trawls (Ackerman, 1941). They were most efficient with the heavy inshore runs of spawning fish such as the winter run of cod on the grounds east of Ipswich or the autumn run of pollock near Cape Ann. Handlines and line trawls are not efficient in those seasons because most spawning fish do not feed and thus do not bite readily on the baited hooks. Today, gill nets are fished by a few vessels from Portland, Maine (fig. 10).

Figure 10.--Hauling a cod aboard a present-day gill netter out of Portland, Maine.

Beam trawl.--The beam trawl (fig. 11) had been known and used in the British Isles since the early 17th Century (Graham, 1956). In the winter of 1891-92 an attempt was made to establish a beam trawl fishery in New England (Smith, 1894). The 95-ton vessel Resolute sailed in November 1891 to Middle Bank (Stellwagen Bank), Ipswich Bay, and finally the southern part of Georges Bank before

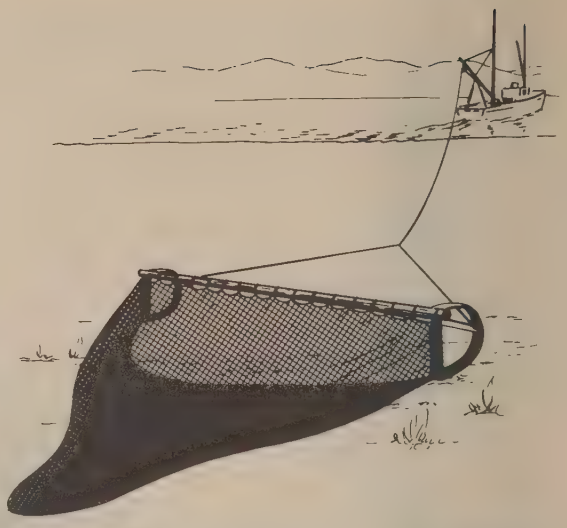


Figure 11.--This beam trawl, used today in some West Coast fisheries, is not very much different from the ones used nearly 100 years ago. The heavy wooden beam across the top of the net gave the gear its name.

finding any concentrations of fish. In a 3-hour haul she caught 10,000 pounds of haddock "...together with dogfish in troublesome numbers."

Smith (1894) described some of the problems with the early beam trawl. The hauls sometimes averaged 12,000 pounds of fish, but the twine burst repeatedly when the load reached 15,000 pounds. Too much wind or too little wind made the use of the beam trawl uncertain. The captain considered the trial a success, but his financial backers would not continue the experiments.

A smaller version of the beam trawl, called a drag net, was used in Provincetown harbor in a winter fishery for flounders around the turn of the century. Townsend (1901) stated that the drag net never achieved widespread use.

Otter trawl.--Perhaps the greatest revolution in fishing gear was the introduction in the United States of the otter trawl (fig. 12) in 1905 (Alexander et al., 1915). It was developed from the beam trawl. In 1894, at the British

Figure 12.--A diagram of an otter trawl fishing on the bottom. It was developed from the clumsier beam trawl.

fishing port of Granton, the beam had been removed and otter boards attached to each wing (Graham, 1956). The otter trawl was much less cumbersome than the beam trawl and more efficient.

The trawl underwent no radical improvements for several decades, but the vessels were improved (figs. 13, 14). Steam trawlers were first used successfully in France in 1876 and in Great Britain in 1881 (Graham, 1956), but the first American steam trawler was the Spray (Alexander et al., 1915). It had been built for Boston owners on the general plan of British fishing steamers and introduced the otter trawl to the American Continent.

The first big change in otter trawling was the introduction, again from Europe, of the Vigneron-Dahl trawl. Developed in 1924-28 (Graham, 1956), it enlarged the effective catch area of the net by placing the otter boards or "doors" some distance forward of the net rather than adjacent to it. This arrangement greatly improved trawling efficiency and increased the catches of vessels that fished the gear.

The otter trawl introduced a new and serious problem. Unlike handlines, line trawls, and gill nets, the otter trawl indiscriminately captured fishes of all sizes, most of which were dead or dying by the time they reached the vessel's deck. Any food fish of unmarketable sizes were discarded at sea and lost to the fishery (Herrington, 1935, 1936). Efforts to solve this problem have been going on for more than half a century and with some success. In 1952, after extensive research by Fish and Wildlife Service biologists, a regulation banned the use of trawl nets with a mesh smaller than 4-1/2 inches in the cod and haddock fishery. This mesh retains the marketable fish but allows most of the small fish to escape.

Figure 13.--A large, steel otter trawler of the type that fishes out of Boston.

Figure 14.--A wooden otter trawler, or dragger. Draggers fish mostly for whiting, flounders, and industrial fish.

Landings and Utilization

A detailed summary and history of the New England cod fishery was given by Jensen and Murray (1965). Some excerpts from this summary are noted below.

The statistics of the cod fishery portray a segment of an entire industry that was affected seriously by technological advances and changing consumer preferences. The annual New England landings of cod (gutted weight) from New England waters during the period 1893-1962 are shown in figure 15. Appropriate conversion factors were used to change landings of dried salt fish, green salt fish, frozen fish, etc., to a standard of gutted fresh fish, the state in which cod is landed today. The graph is included here because changes in cod landings generally followed the

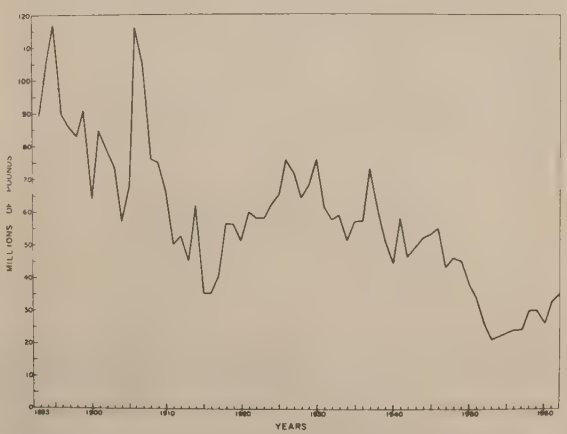


Figure 15.--Annual New England landings of cod (gutted weight) from New England waters during the period 1893-1962.

fluctuations of the entire New England fishing industry. For example, the rapid increase in landings in 1905-06 probably reflects the introduction of the otter trawl.

Fishing effort was low for all species after World War I and during the postwar depression, a situation that is reflected in the lower cod landings in 1914-27. During the 1930's, the industry experienced a series of rapid ups and downs caused by several interrelated factors that included decreased abundance of fish and a tie-up of vessels as a result of the general economic depression of all American industry.

Recent changes in cod landings resulted from decreased fishing effort offshore in World War II, a decline in landings in the early 1950's (presumably caused by an increase in haddock abundance), and a slight rise in cod landings in the late 1950's caused by a decline in haddock abundance.

From the beginning, the New England cod catch was split, salted, and dried. Only a small quantity from the shore fisheries, and during the winter from the bank fisheries, was landed fresh. Salt cod was a staple food on both sides of the North Atlantic and had been one of the first export items from the American Colonies.

The evolution from a salt cod market to a fresh and frozen cod market was largely the result of technological changes in handling the catch at sea and ashore. Improved ice-making machines, the improvement in fishing gear, and the transition to steam and diesel engines made it possible for the vessels to take larger quantities of fish and bring the catch to market rapidly and in good condition.

Shortly after World War I, Clarence Birdseye, in Gloucester, and Harden F. Taylor of the Bureau of Fisheries, developed quick-freezing processes that were readily adaptable to freezing fish. The industry then began to market quick-frozen, boneless, ready-for-the-pan fillets that soon changed the public's taste from salt to fresh fish. Now, species that did not salt well--haddock and ocean perch--could be filleted and frozen. It was not long before new markets blossomed for the products.

OTHER FISHERIES

Haddock

In the heyday of the salt-bankers, haddock were considered trash fish to be avoided when possible, discarded when unavoidable, or salted only as a last resort. Sabine (1853) noted: "The hake and haddock are poor fish, and neither commands more than half the price of the cod. . . . The haddock, when fresh, suits the taste of some; but when dried, it is without reputation even in the hut of the [poorest man], who is doomed to be its principal consumer."

The use of ice aboard some of the bank fishing vessels toward the close of the 19th Century made more fresh haddock available to a still limited but growing market. From 1880 to the early 1900's New England haddock landings were fairly stable; the average annual landings were on the order of about 54 million pounds.

The greatest boon to the haddock fishery was the innovation of filleting fish at the port, in Boston, in the autumn of 1921 (White, 1954). Before then, fish had been filleted at the retail markets to the order of individual customers. Haddock was the first species in which fillets rather than whole fish were shipped to retailers. Soon, brand-identified fresh fillets were offered, followed by packages of frozen fillets that made haddock available on a nationwide basis. Landings soon increased rapidly from about 90 million pounds in 1921 to a peak of 294 million in 1929. The bulk of the catch came from Georges Bank; some came from Browns Bank, Nantucket Shoals, and the various inshore grounds (fig. 16).

From 1929 to 1934, severe declines of haddock abundance and fishing effort brought a marked decrease in New England landings. In 1935 to 1941, however, landings increased because of an increase in haddock abundance and fishing effort on Georges Bank. In the 1940's, landings of haddock from Georges Bank were about 100 million pounds per year, but during the 1950's landings declined to about 83 million pounds per year. The level of abundance on Georges Bank today is slightly below that of the 1940's.

Figure 16.--Dressing haddock on board a trawler out of Boston. The fish will be stored in ice in the hold, filleted ashore, and sold to the consumer as fresh or frozen fillets.

Ocean Perch

The Cinderella of New England commercial fishes is the ocean perch (Haberland, 1946). Few were caught on the old hook-and-line gear, but the otter trawl began to make some inroads on the, until then, unexploited stocks. The ocean perch, with its spiny projections, was unsuitable for salting, and most of those that were caught were discarded as trash. Before World War I, a few million pounds were landed each year in Europe for the fresh fish market. After the war, some also was sold fresh in the United States, but the ocean perch was never a great competitor in the market for salt cod and, later, fresh haddock. The situation changed radically, however, in the middle 1930's. By chance, a fish cutter found that the ocean perch yielded a small white fillet with a taste and texture similar to fresh-water perch. The product found a ready market in the Middle West and South where the taste of yellow perch was familiar. Changing the name of the product to "ocean perch" (it is sometimes also marketed as rosefish) increased its acceptance. Thus, a whole new fishery was born.

The filleting of ocean perch originated in Boston, but space was insufficient for handling the new product. Gloucester seemed a likely location. Although it once reigned as the salt fish capital, fish processing in Gloucester had declined, mostly because of foreign competition beginning about 1900, and hit the economic bottom in 1933 (White, 1954).

Empty wharves and buildings were available for the ocean perch processing plants and this space paved the way for a new "Golden Era of Fishing" for the city of Gloucester.

The New England ocean perch fishery has concentrated on a series of areas. The earliest fishing in the Gulf of Maine took place in the deep water along the edges of Cashes Ledge, the Great South Channel, and many of the various holes in the area.

Later, the fleet moved eastward as new ocean perch stocks were discovered on the Nova Scotia banks, Newfoundland banks, and in the Gulf of St. Lawrence. In each area, landings rose to a peak as fishing effort increased for a few years. Later, as catch-per-day began to decline in one area, the effort was diverted to new areas.

The trend in annual average catch-per-day of ocean perch has been slowly downward in the four fishing areas mentioned above, each area approaching equilibrium at a different level. The ocean perch landings from the combined areas reached a peak in 1951 and then declined as catch-per-day diminished and effort was reduced. Landings recently have stabilized at about 140 million pounds per year.

Whiting

Whiting (silver hake) is now used in more different ways than is any other single species (Fritz, 1960). Not only is it widely consumed as human food, but it is reduced for meal and oil, and is an important part of animal food preparations. It was not always so; a century or more ago whiting was discarded as trash. Provincetown fishermen of the time were plagued during July and August when large quantities of whiting were caught in the nets set for mackerel. Often it took 8 to 10 hours to clear the nets of the unwanted fish. Although whiting was abundant, there was no market for it. It did not salt well and unless it was kept cold, or eaten soon after capture, the flesh became soft and tasteless.

Beginning about 1840, a small, local fishery started for fresh whiting (Storer, 1867). Later, the species was used as bait in a hook-and-line fishery for spiny dogfish. (Presumably the dogfish were intended for guano and oil.)

Real interest in whiting appeared about 1920 when limited amounts were shipped to fried-fish shops in and around St. Louis, Mo. (Johnson, 1932). An active food fishery, however, did not begin until the 1930's.

At first, whiting was used only for human food, but as time went on, industrial and animal food markets were developed. In 1937, about 20 million pounds were landed, and by 1957 this figure increased to nearly 180 million pounds (Fritz, 1960). In recent years, the food fish landings of whiting have averaged about 70 million pounds annually.

During the early years the fishery was largely a pound and trap net operation, but in the 1930's the otter trawl became the principal fishing gear, as it is today (fig. 17). The freshly caught fish are iced at sea and usually landed whole, but sometimes they are headed and gutted at sea. The fish intended for human food go on conveyors to machines that automatically scale, wash, and, if necessary, head the whiting. The dressed fish then are trimmed (fig. 18) and packed by hand into retail- and institutional-size packages and frozen before distribution to market.

Flounders

The prosperous New England flounder fishery also owes much of its development to technological advances. The catches were very small until the advent of the otter trawl. Later, the introduction of filleting and freezing greatly increased the acceptability of the product. Some flounders, including blackbacks and fluke, were sold in the round in the retail market. Other flounders, including dab and gray sole, were sold as fillets under the name "sole." Yellowtail flounder was abundant, but most dealers considered it too thin to be sold in the round and not well enough known to

Figure 17.--Preparing to sort the catch on the deck of a dragger that fishes for whiting. The catch here includes a variety of species.

Figure 18.--Dressing whiting in a Gloucester packing plant. The fish are destined for human food.

compete as fillets with the other flounders (Royce, Buller, and Premetz, 1959).

The situation changed rapidly, however, when the abundance of blackback flounder declined severely in the middle 1930's (Perlmutter, 1947) and the industry sought a substitute. The abundant yellowtail flounder yielded a thin but fine-flavored fillet; soon it began to appear in the retail trade. The increased demand for fish products of all kinds during World War II made the yellowtail flounder even more desirable.

The fishery for yellowtail flounder in recent years was described by Lux (1964). The catch rose from slightly under 23 million pounds in 1938 to about 70 million pounds in 1942. It dropped to a low of 12 million pounds in 1954, but in recent years has stabilized at about 30 million pounds per year. About 70 percent of the catch is landed at New Bedford, Mass.

The principal fishing grounds for yellowtail flounder are from off eastern Long Island to south of Nantucket Island and on east-central Georges Bank. Blackback flounders are caught mostly on Nantucket Shoals and in Nantucket Sound; a few are taken on Georges Bank. Most of the New England catch of fluke is taken during the winter and early spring when the fish are concentrated on the offshore grounds from Hudson Canyon to Veatch Canyon.

Sea Scallops

Although the smaller bay scallop had been a well-known shellfish since Colonial times, the giant, or sea, scallop was more or less a rare curiosity until well into the 19th Century (Smith, 1891). In 1845, a specimen was described from a shell found in the stomach of a codfish, and line fishermen occasionally retrieved giant scallops that had been hooked by chance. A commercial fishery, however, was not begun until about 1883, along the coast of Maine. At first, the fishermen used oyster dredges but later modified them for the rocky bottoms and deep water of the scallop beds.

The vessel anchored over the scallop bed and a small boat carried the dredge a distance away and dropped it to the bottom. Men aboard the anchored vessel then retrieved the dredge and its contents. Sometimes the dredge was towed behind the small boat.

In the beginning of the industry, as now, only the adductor muscle (eye, or meat) of the scallop was eaten. Some attempts were made unsuccessfully to can the meats for the market. The salted meats were tried as bait for cod on the line trawls but were no better than the salted clams then used. The fishermen were not interested in salting the "rims" (the viscera, mantle, and other uneaten body parts of the scallop) for bait and these were discarded, as they are today.

The production of the New England sea scallop fishery was small in its beginnings compared to the modern fishery. In 1889, for example, 29,851 gallons of scallop meats, worth $18,647 to the fishermen, were landed in Maine (Smith, 1891).

Records for the early years are incomplete, but it was not until 1931 that the annual landings of sea scallop meats in New England exceeded a million pounds. Total landings climbed gradually during the 1930's, reaching 10 million pounds (70 percent landed in New England) in 1939.

Landings declined during the war but rebounded immediately after the war's end. As landings continued to increase in the late 1940's, New Bedford became the major port for landings of sea scallop meats. In some years, over 80 percent of total landings were at New Bedford. In the early 1950's, landings stabilized at about 18 million pounds per year. A dominant year class entered the Georges Bank fishery in 1959. The resulting abundance led to a dramatic increase in landings that reached 36 million pounds in 1962.

The vessels and gear used in the modern sea scallop fishery are a far cry from the early small boats and modified oyster dredges. Today, diesel-powered vessels, 60 to 100 feet long, use two heavy specially made dredges, each 11 feet wide (fig. 19). They are towed together, one from each side of the ship, and hauled back alternately and emptied on deck.

Figure 19.--A scallop dredge just coming out of the water. Note the scallops in the iron-ring bag. This New Bedford vessel is fishing on Georges Bank, a productive area for sea scallops.

Industrial Fishery

New England's industrial trawl fishery in the broad sense began in the late 1940's, largely as the result of at least two different fishery developments. The first was the failure of the California sardine fishery on the U.S. West Coast; the sardine was a prime source of meal and oil. The second was the extension of the menhaden fishery into New England waters. The sizeable demand for protein animal food supplements could be satisfied in part with the relatively unused resource of non-food fishes off the New England coast. In addition, when the abundance of the yellowtail flounder declined, many Southern New England fishermen turned to fishing for industrial species for part of their income.

The fishery developed rather rapidly. In 1948, New Bedford landings of industrial fish were slightly more than 4 million pounds, bought entirely by mink farm operators (Snow, 1950). In 1949, however, New Bedford industrial landings were over 44 million pounds, bought entirely by reduction plants for the preparation of fish meal.

The fishery depended largely on only a few species (Edwards and Lux, 1958). Red hake, whiting, little skate, and big skate together accounted for all but a very small percentage of the industrial fish landed (fig. 20) (Edwards, 1958; Edwards and Lawday, 1960). Commercially important food fish were taken in very small quantities.

For a time (1954-59), landings averaged over 100 million pounds a year. Whiting made up about 25 percent of the total catch by

Figure 20.--Unloading industrial fish at a New England fish reduction plant. The species here are mostly whiting and red hake.

weight, and red hake made up about 50 percent from the Gulf of Maine grounds, but the proportion was 15 percent and 70 percent, respectively, from Southern New England grounds. The remainder of the catches included a variety of species, most of which had little or no commercial value as food fish.

The fishery declined rapidly with the development of the Peruvian anchovy fishery and the local decline of the abundance of menhaden. Another segment of the industrial fishery--for pet and mink food--continued to develop at a slow but steady pace. Landings at present are about 25 million pounds per year.

SUMMARY

The marine fisheries of New England were the first commercial enterprise of what is now the United States. Years before the War of Independence, the large export trade in dried, salt fish had gained an important place for the Colonies in world trade.

From the many fishing villages and shoreside towns of New England, hundreds of vessels have fitted out over the years to harvest with lines and nets the finfish and shellfish crop of the Northwest Atlantic Ocean. The schooners of Gloucester made extended trips to the offshore banks--Georges Bank, Browns Bank, Banquereau--and as far as the Newfoundland banks in search of cod. After months at sea, the schooners sped home with all sails set and their holds packed with the split and salted cod.

Great changes have taken place in the vessels and the gear used to take the marine harvest. Faster vessels with powerful engines and the use of otter trawls instead of lines with hooks now allow quicker trips to and from the fishing banks and larger catches. The catch is no longer salted at sea but is chilled on ice and delivered fresh to the markets. Increased efficiency in catching and handling the fish at sea and ashore resulted in expanded fishing effort and wider markets for species previously discarded. Haddock, ocean perch, flounders, and whiting are among the fishes now preferred by the American consumer.

The New England fisheries have had a colorful history. Technological improvements, however, have put the modern fishing fleet on a more industrialized and efficient basis. And thanks to these improvements, consumers now enjoy a greater variety and better quality of fish products than ever before.

LITERATURE CITED

ACKERMAN, EDWARD A.
1941. New England's fishing industry. Univ. Chicago Press, Chicago, 303 p.

ALEXANDER, A. B., H. F. MOORE, and W. C. KENDALL.
1915. Otter-trawl fishery. U.S. Bur. Fish., Rep. U.S. Comm. Fish., 1914, append 6, 97 p.

BABSON, JOHN J.
1860. History of the town of Gloucester, Cape Ann, including the town of Rockport. Proctor Bros., Gloucester, Mass., 610 p.

BAIRD, SPENCER F.
1873. Description of apparatus used in capturing fish on the sea-coast and lakes of the United States. U.S. Comm. Fish Fish., Report on the condition of the sea fisheries of the south coast of New England in 1871 and 1872: 253-274.
1874. Conclusions as to decrease of cod-fisheries on the New England coast. U.S. Comm. Fish Fish., pt. 2, Rep. Comm. 1872 and 1873: xi-xiv.

BRIGHAM, ROBERT K.
1962. Construction of a fish weir. Com. Fish. Rev. 24(6): 12-14.

COLLINS, J. W.
1887. The gill-net cod fishery. In George Brown Goode, The fisheries and fishery industries of the United States, sect. 5, 1: 226-233. U.S. Government Printing Office, Washington, D.C.

DODGE, WILLIAM [and others].
1880. A petition to the Fish Commission of the United States, signed by the fishermen of Block Island, June 12, 1877. U.S. Comm. Fish Fish., pt. 6, Rep. Comm. 1878: 35-39.

EARLL, R. E.
1880. A report on the history and present condition of the shore cod-fisheries of Cape Ann, Mass., together with notes on the natural history and artificial propagation of the species. U.S. Comm. Fish Fish., pt. 6, Rep. Comm. 1878: 685-740.

EDWARDS, ROBERT L. and FRED E. LUX.
1958. New England's industrial fishery. Com. Fish. Rev. 20(5): 1-6.

EDWARDS, ROBERT L. and LEWIS LAWDAY.
1960. Species composition of industrial trawl-fish landings in New England, 1958. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 346, iii + 20 p.

FRITZ, RAYMOND L.
1960. A review of the Atlantic coast whiting fishery. Com. Fish. Rev. 22(11): 1-11.

GRAHAM, MICHAEL (editor).
1956. Sea fisheries, their investigation in the United Kingdom. Edward Arnold, London, 487 p.
HABERLAND, HOMER.
1946. Gloucester--three centuries a fishing port. Fish Wildl. Serv., Fish. Leafl. 192, 5 p.
HERRINGTON, WILLIAM C.
1935. Modifications in gear to curtail the destruction of undersized fish in otter trawling. [U.S.] Bur. Fish., Invest. Rep. 24, 48 p.
1936. Decline in haddock abundance on Georges Bank and a practical remedy. [U.S.] Bur. Fish., Fish. Circ. 23, 22 p.
JENSEN, ALBERT C. and HARRIETT E. MURRAY.
1965. The U.S. cod fishery in the Northwest Atlantic. Com. Fish. Rev. 27(7): 1-11.
JENSEN, ALBERT C. and ROBERT K. BRIGHAM.
1963. The line-trawl fishery for cod and haddock at Chatham, Massachusetts. Com. Fish. Rev. 25(6): 14-19.
JOHNSON, F. F.
1932. Some unusual markets for fish and shellfish. [U.S.] Bur. Fish., Fish. Circ. 11, 31 p.
LOTURE, ROBERT DE.
1957. History of the great fishery of Newfoundland. [Translated from the French by Clyde C. Taylor.] U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 213, 147 p.
LUX, FRED E.
1964. Landings, fishing effort, and apparent abundance in the yellowtail flounder fishery. Int. Comm. Northwest Atl. Fish., Res. Bull. 1: 5-21:
PERLEY, M. H.
1852. Reports on the sea and river fisheries of New Brunswick, 2d ed. J. Simpson, Queen's Printer, Fredericton, 294 p.
PERLMUTTER, ALFRED.
1947. The blackback flounder and its fishery in New England and New York. Bingham Oceanogr. Coll., Bull. 11(2): 92 p.
ROYCE, WILLIAM F., RAYMOND J. BULLER, and ERNEST D. PREMETZ.
1959. Decline of the yellowtail flounder (Limanda ferruginea) off New England. U.S. Fish Wildl. Serv., Fish. Bull. 59: 169-267.
SABINE, LORENZO.
1853. Report on the principal fisheries of the American seas. Prepared for the Treasury Department of the United States. Robert Armstrong, Printer, Washington, 317 p.
SETTE, OSCAR E.
1928. Statistics of the catch of cod off the east coast of North America to 1926. [U.S.] Bur. Fish., Rep. U.S. Comm. Fish., 1927, append. 9: 737-748.
SMITH, HUGH M.
1891. The giant scallop fishery of Maine. Bull. U.S. Fish Comm. 9: 313-335.
1894. Report on the Division of Methods and Statistics of the Fisheries. U.S. Comm. Fish Fish., pt. 18, Rep. Comm. 1892. cxxxiii-cxci.
SNOW, GEORGE W.
1950. Development of trash fishery at New Bedford. Com. Fish. Rev. 12(7): 8-10.
STORER, DAVID H.
1867. A history of the fishes of Massachusetts. Welch & Bigelow and Dakin & Metcalf, Cambridge and Boston, 287 p.
TOWNSEND, C. H.
1901. Statistics of the fisheries of the New England states. U.S. Comm. Fish Fish., pt. 26, Rep. Comm. 1900: 311-386.
[U.S.] BUREAU OF FISHERIES.
1935. Fish and shellfish of New England. In Our aquatic food animals. Memorandum I-134a, 36 p.
WHEELER, CHARLES L.
1955. The ocean fishery, Massachusetts oldest industry. Mass. Dept. Nat. Res., Div. Mar. Fish., Boston, 27 p.
WHITE, DONALD J.
1954. The New England fishing industry. Harvard University Press, Cambridge, 205 p.

APPENDIX

Names of Species Mentioned in Text

Bay scallop	Pecten irradians Lamarck
Sea scallop	Placopecten magellanicus (Gmelin)
Spiny dogfish	Squalus acanthias Linnaeus
Big skate	Raja ocellata Mitchill
Little skate	R. erinacea Mitchill
Alewife	Alosa pseudoharengus (Wilson)
Shad	A. sapidissima (Wilson)
Menhaden	Brevoortia tyrannus (Latrobe)
Sea herring	Clupea harengus harengus Linnaeus
Pacific sardine	Sardinops caerulea (Girard)
Atlantic cod	Gadus morhua Linnaeus
Haddock	Melanogrammus aeglefinus (Linnaeus)
Whiting (Silver hake)	Merluccius bilinearis (Mitchill)
Pollock	Pollachius virens (Linnaeus)
Red hake	Urophycis chuss (Walbaum)
White hake	U. tenuis (Mitchill)
Boston mackerel	Scomber scombrus Linnaeus
Ocean perch (Redfish)	Sebastes marinus (Linnaeus)
Atlantic halibut	Hippoglossus hippoglossus (Linnaeus)
Dab	Hippoglossoides platessoides (Fabricius)
Fluke	Paralichthys dentatus (Linnaeus)
Yellowtail flounder	Limanda ferruginea (Storer)
Blackback flounder	Pseudopleuronectes americanus (Walbaum)
Gray sole	Glyptocephalus cynoglossus (Linnaeus)

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